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May 2003 Volume IV, Issue 5

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'Partnerships' is theme for annual NASTC convention

by Jo Anne Rumple, ASC Public Affairs

WRIGHT-PATTERSON AIR FORCE BASE, Ohio — "Partnerships for War-Winning Capability" was the theme this week as Air Force, Army, Navy, NASA and industry representatives met for the fourth annual National Aeronautical Systems and Technology Conference to discuss changes in military operations, requirements, challenges and solutions. Introducing the sessions, Lt. Gen. Dick Reynolds, commander of Aeronautical Systems Center, related how the success of Operation Iraqi Freedom has led to a renewed impetus for initiatives to transform the Air Force to enhance rapid delivery of war-winning capability.

Reynolds and Maj. Gen. Paul Nielsen, commander of Air Force Research Laboratory, hosted the conference.

In two days of sessions at the Dayton Convention Center and another day at Wright-Patterson, attendees heard briefings and asked questions on topics ranging from the role of the National Aerospace Commission, to enterprise leadership, new technologies and major aerospace initiatives.

Briefers emphasized the role that the aerospace industry plays in U.S. national security, and the critical role that air and space power play on the modern battlefield. Additionally, according to F. Whitten Peters, former secretary of the Air Force and lead-off speaker for

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2nd Lt. Jonathan Lee, Air Force Research Laboratory, Human Effectiveness Directorate, talks with Charles Vanderberg during NASTC. In Lee's hand are molded earphones that will be used in the Battlefield Air Operation kit used by Air Force Special Operations Command people. AFRL is helping to streamline the kit by making the equipment lighter. (Air Force photo by Spencer P. Lane)

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May 2003

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news@afrl is published monthly by the Office of Public Affairs of Air Force Research Laboratory Headquarters. Contact the office at AFRL/PA, Building 15 Room 225, 1864 4th St., WPAFB, Ohio, 45433-7132, (937) 656-9872/9876, or send e-mail to AFRL.PA@afrl.af.mil. Contents of this newsletter are not necessarily the official views of, or are endorsed by, the U.S. Government, the Department of Defense or the Department of the Air Force. The editorial content is edited, prepared and provided by this office. Photographs are official U.S. Air Force photos unless otherwise indicated. Submission guidelines are available from this office or on-line. Electronic copies and additional full-text articles are available on-line at:

http://extra.afrl.af.mil/news/index.htm

Powered LOCAAS hits target in first complete system flight test

by Rex Swenson, Munitions Directorate

EGLIN AIR FORCE BASE, Fla. (AFMCNS) — Transforming the battlefield was the focus March 28 as Air Force Research Laboratory Munitions Directorate experts here successfully put the service's powered Low Cost Autonomous Attack System through its paces.

Equipped with a multi-mode warhead, the LOCAAS system — with no outside control — successfully located, attacked and fired a warhead at a target for the first time, according to Col. Michael Ruff, AFRL Munitions Directorate Director.

"This test represents a significant step in demonstrating an autonomous wide area search miniature munition capability for the warfighter," Ruff said. "The technology demonstrated today offers the potential to transform the battlefield in the near term."

In this test, experts released LOCAAS from a test aircraft over the Eglin range. After flying under its own power, LOCAAS used its onboard Global Navigation System and Inertial Navigation System to navigate to two waypoints before searching for the target — a relocatable surface-to-air missile launcher, Ruff said.

The laser radar seeker, automatic target acquisition algorithms, and guidance and control software worked together to provide the multimode warhead and fuse with information to time the arming sequence, mode selection and time to detonate, he said.

In the target area, LOCAAS rejected a non-target military vehicle Ruff said was intended to confuse the system, as could occur in an actual battlefield scenario.

"The LOCAAS acquired and correctly identified the target, tracked it, and detonated the warhead above the target at the appropriate time and location," he said. "Fragments from the warhead impacted and penetrated the SAM transporter, launcher and radar system. All flight test objectives were met."

Developed in conjunction with Lockheed Martin Missiles and Fire Control, LOCAAS is designed to be compatible with F-16, F-22, Joint Strike Fighter, B-1 and B-2 aircraft, he said. It can also be dispensed from a Multiple Launch Rocket System rocket or an Army Tactical Missile System. @

Other features online include:

Commander visits Edwards Research Site

AFRL Contracting Director set to retire

ML partners with brass quintet for instrument testing

by Timothy R. Anderl, Materials and Manufacturing Directorate

WRIGHT-PATTERSON AIR FORCE BASE, Ohio — The Air Force Research Laboratory's Materials and Manufacturing Directorate (ML) is collaborating with the world renowned Canadian Brass quintet to better understand how advanced materials, which the directorate develops for air and space components, can be applied to musical instruments.

This activity resulted from the Brass' interest in these materials and the benefits they may provide to their instruments. The Brass' tuba player currently uses a carbon-fiber-reinforced polymer matrix composite (PMC) tuba bell, and the benefits he has experienced may also be applied to additional instruments such as trumpets, trombones and French horns. The directorate expects that activities initiated by ML, while addressing musical components, will also lead to a better understanding of how these materials will perform in Air Force applications.

According to Dr. Allan Katz, chief of the directorate's Ceramics Branch, dialog between the Brass and the directorate was initiated by his wife, a member of the Dayton Philharmonic Orchestra (DPO). She observed the unusual PMC tuba bell when the Brass performed during a DPO concert and arranged a quick meeting between the Brass and Dr. Katz. It was clear from this initial, brief discussion that the members of the Brass were interested in learning about composites and other advanced materials that might be applied to their instruments.

A small group discussion between composites engineers from the directorate and the Brass was arranged in July 2002 in conjunction with the group's performance with the Dayton Philharmonic Orchestra at the Fraze Pavilion, Kettering. Dialog with the Brass continued with a visit to the directorate in December, when the Brass was performing in Cincinnati and Springfield. During the visit, members of the Brass displayed and demonstrated their instruments. This allowed ML scientists to hear and appreciate the differences in sound between various instrument configurations, Katz said.

Canadian Brass member Ryan Anthony demonstrates a carbon-fiber-reinforced polymer matrix composite (PMC) trumpet mute during a meeting with scientists and engineers from the Materials and Manufacturing Directorate.

Researchers were particularly interested in the demonstration of four PMC tuba bells, as well as a PMC trumpet mute. According to Katz, the best of the PMC bells provided a richness and clarity of sound that was very noticeable when compared to the other bells. The PMC bells had been custom made at the Brass' request, most of them by the Yamaha Band and Orchestra Division with whom the Brass has a close working relationship. The bells were of different thicknesses and composite constructions, which the researchers believe relate to the resulting differences in sound character.

The tuba player reported that the PMC bells (versus brass) produce sound that can be heard well at the ear while also projecting into the performance hall, and are more responsive.

The PMC trumpet mute was also of special interest to directorate scientists, Katz said. Unlike metallic mutes, the composite mute did not alter pitch or playing resistance with the degree of muting applied by the musician.

"The visit in December reinforced the notion that we can contribute to increased understanding of the role of advanced materials in traditional 'brass' instruments," Katz said. "The issues, in many ways, are similar to ones we face in aerospace applications."

"For example, though hot exhaust washed ducts and engine cowlings found on aircraft are not an exact match, the tuba bell does bear some resemblance," said Tia BensonTolle, chief of the directorate's Structural Materials Branch. "Aircraft components are often acoustically excited, and vibrational modes, resonances and damping can be critical to performance of systems in an operational environment where excess vibration can cause material fatigue and unwanted noise levels in an aircraft. Understanding these parameters and how to control and apply them to materials selection and design, whether for aerospace components or musical instruments, bears a keen resemblance and importance to materials such as composites."

The collaboration between the directorate and the Canadian Brass will allow them to discover how advanced materials characteristics impact sound character. The directorate will use this understanding to help select and design materials that will sound better and will be more responsive for the musician while gaining important knowledge about vibration and damping properties of materials in Air Force structures.

Among first activities that the partners planned, the directorate enlisted the support of Navy colleagues who have developed a novel technique for measuring resonant frequencies and damping in composite structures. Preliminary data obtained from two PMC tuba bells show differences that may lead to key insights, said BensonTolle. ML personnel met with Navy researchers recently to

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Four from AFRL chosen as Hispanic Powerhitters

by Katherine Gleason, AFRL Public Affairs

WRIGHT-PATTERSON AIR FORCE BASE, Ohio — Four individuals from the Air Force Research Laboratory have been selected by the nation's premiere Hispanic technology magazine as being among the country's most powerful Hispanic executives in technology and business.

Hispanic Engineer & Information Technology magazine has published a list of the 50 most important Hispanics in business and technology since 1999. The list aims to demonstrate that the country is embracing diversity and creating a more inclusive workforce.

Raymond Flores, Mayra Martinez, Ricardo Negron, and Robert Torres were among 13 selected from the Air Force. Each honoree will be featured in a full profile in the May issue of the magazine.

Flores was recognized for his work as the Chief Information Officer of the Air Vehicles Directorate from July 2001 through April 2003. In this capacity, he was responsible for the development and application of information technologies that served to benefit the nearly 400 managers, scientists and engineers throughout the directorate. Flores currently serves as Chief, Operations Integration Branch for Air Vehicles Directorate (VA), where he manages a 14-person branch providing human resources, information technology, facility, records management, safety and training support to the entire directorate.

"I'm very honored to receive this award," said Flores. "None of this would have been possible without the guidance I've received from my mentors and senior management over the years in AFRL, and in VA. They provided me with the challenges and opportunities to excel."

Flores also commented on the importance of serving as a role model for Hispanic youth by showing them what can be achieved with science and math skills. "The Hispanic community, and schools at all levels need to be made aware of the amazing opportunities available in the areas of science and technology."

Martinez, a programs team leader in AFRL's Materials and Manufacturing Directorate's (ML) Integration and Operations Division, was selected for her work in laboratory operations, technology transfer, public affairs, marketing, and educational outreach programs. Martinez has been employed in the Programs Team Lead position since 2000.

Raymond Flores

Mayra Martinez

Ricardo Negron

Robert Torres

Negron currently works as a senior electronics engineer for the Plans and Programs Directorate, where he is chief of the Technology Transfer Branch. In this capacity, he coordinates and supervises the efforts of 15 people in the areas of technology transfer, small business innovation research, dual use science and technology, and independent research and development. These programs are funded at more that $250 million annually, and award hundreds of technology development contracts to businesses nationwide.

"I was pleasantly surprised to see that of the 13 Air Force Hispanics selected for the award, four are from AFRL," said Negron. "This shows the quality of our people as a whole."

Torres works as the wideband technology team leader for the Directed Energy Directorate at Kirtland Air Force Base, N.M. This directorate is the Department of Defense's center of expertise for lasers, high-power microwaves and other directed energy technologies.

Honorees were selected from hundreds of candidates in the private sector, government, and academia. They were chosen based on their progressive leadership responsibilities; achievements in advancing access to technology; effectiveness in engaging technology; and their contributions to furthering technical literacy within the Hispanic community. @

Brass (from page 3)

learn the results firsthand and to observe their research technique. Scientists at the directorate expect to apply the method to analysis of a range of materials and structures of interest to the Air Force.

As time and resources permit, ML personnel also plan to fabricate small components in the lab, with varied materials design (for example, with different fiber reinforcement architecture), to assess the impact on musical sound character. These components may include PMC mouthpieces, lead pipes (the small transition piece between the mouthpiece and the body of the instrument), and mutes.

According to Dr. Mark Tudela, a directorate researcher who specializes in characterizing material behavior, they will initially focus on the French horn bell because it is small enough to be fabricated in-house, with varying PMC constructions. The French horn is configured to accept interchangeable bells, which will permit the direct comparison of audible sound character and the measurement of vibration characteristics in differing PMC bells. Tudela suggested that the directorate might also examine metal alternatives to brass for mouthpieces, and ceramics for valves.

"The materials design and fabrication will be a valuable learning experience since musical characteristics are an interesting and challenging measure of materials performance," Tudela said. "Any applicability to traditional brass instruments or to fighter aircraft would be an added benefit."

"Ultimately, the goal of the Canadian Brass is to improve their instruments by use of advanced materials, to find suppliers who will employ these materials to make the musical components, and to educate the public so that the use of these materials for instruments becomes more widespread," Katz added. "These aims are fully consistent with the Air Force's technology transfer interests. We also expect to learn much during this collaboration about the behavior of a number of Air Force structural components and materials that will help us achieve the valuable properties and characteristics that we desire." @

NASTC (from page 1)

the conference, the aerospace industry is also important to domestic well-being. It accounts for 15 percent of gross domestic product, 15 million jobs and five percent of the national budget. Peters described some notable spin-offs of the aerospace industry that have benefited the entire population, including the Hubble Telescope, robotic exploration and GPS-enabled cell phones, as well as a slew of others.

Peters and other briefers noted that reduced military budgets and a dwindling investment in the aerospace industry foreshadow coming problems for the country as a whole and will require a federal, unified approach to overcome results of these shortfalls, such as the one in air traffic management expected by 2010.

Reynolds discussed the role enterprise leadership has played and its success to date in getting critically needed capabilities to war fighters. For example, for Operation Iraqi Freedom, by integrating activity horizontally across Air Force Materiel Command product centers, the aeronautical enterprise was able to develop a means of taking out the enemy's GPS-jamming systems. "As you know, we took out all six of those GPS jammers in theater," he said.

Other issues being worked by the enterprise leadership include combat identification, accelerated data extraction and time critical targeting. "Now," he said, "we need to work on more extensive integration and bringing our industry partners into this activity earlier in the process."

"Enterprise leadership is harmonizing and focusing our efforts," he said. "It has become our link to effects-based capabilities planning."

The next iteration of the enterprise process, he said, is the formation of "virtual" capability development groups -- linked across weapon system program offices and centers to work on critical gaps in Air Force war-fighting capabilities. Those capability development groups are being organized for air and space superiority, global attack, global mobility, agile combat support and information dominance functions.

Gen. Lester Lyles, commander of Air Force Materiel Command, spoke about the way his entire command — including ASC and AFRL — has been transforming to support war fighters. He spoke of command initiatives enhancing war-fighter support across acquisition, sustainment, test and evaluation, and research activities. He added that the command has begun transforming the business side of their operations, as well. "We want AFMC to lead business transformation for the Air Force," he said.

He added that the command is still addressing issues related to work force shaping, including retention of scientists and engineers and hiring the next generation of those experts. Lyles also emphasized that the rest of the Air Force values the work done by AFMC people. "I've spoken with senior leaders, including our chief of staff, and they place a high value on the acquisition community and what we've contributed to the fight, " he said.

Other briefers, including those representing U.S. Army and Navy organizations, echoed the emphasis on transformation, including a focus on capabilities needed for "network-centric" warfare.

Briefers also covered the need for open, system of systems "architectures" to enable the "plug and play" data and communications systems necessary to make even more progress in this area.

Additionally, briefers noted that, where once the Air Force and its sister services funded development of individual weapon systems platforms, they are now funding programs to fill gaps in capabilities needed by war fighters.

Nielsen noted that Air Force science and technology has also been reorganized to solve current capability gaps, as well as to provide far-reaching, long-range technology development for capabilities that may be needed in future battles.

"We're making sure our war fighters go into combat with the best technology, the best equipment we can give them, so they have a qualitative edge," he said. "Advanced technology is evident everywhere in military combat operations — common data links, manned and unmanned aircraft, weapons and information systems being just a few examples."

Nielsen also discussed the multitude of technologies the laboratory has provided for the F/A-22 Raptor and F-35 Joint Strike Fighter — materials and design, ultra-reliable radar, advanced metallic structures, advanced avionics, advanced flight controls, multi-function integrated radio frequency systems, affordable unitized composite materials and many more.

The general also mentioned a unique experiment the laboratory conducted last month, using an unmanned aerial vehicle to deliver and drop tiny, unmanned ground vehicles to set up a ground-based sensors network.

Among the laboratory's contributions to Operation Iraqi Freedom, said Nielsen, were rapidly developed technologies to counter GPS jammers; the massive ordnance air burst, or MOAB, and other new types of bombs; panoramic night vision goggles; laser eye protection and components for the battlefield air operations kit carried by special forces — which lightened their backpacks and improved communications.

Areas the laboratory will be investigating in the near future include, among others, bio- and nano-technology, increased space investment, a push to transition directed energy from use only as a weapon to additional uses in sensors and communication and a higher level of integration among technologies.

Noting that this conference was being held during the centennial celebration of powered flight, Nielsen remarked that conferees should "be aware of accomplishments during the last 100 years but also be mindful that we'll create the accomplishments of the next 100." He added a reminder that technology is critical to 21st century forces and that collaboration with industry prime and sub-contractors is vital to achieving U.S. combat goals.

Attendees also were treated to a status update on programs like the joint service, multinational F-35 Joint Strike Fighter and the capabilities it will bring to the coalition battlefield commander with its advanced avionics, data links and adverse weather precision targeting, in addition to a state-of-the-art prognostic health management system — a system which alerts maintainers to the need to repair or replace parts before they break down.

Many of the briefers also noted the need to continue joint development programs, to make the most efficient use of money available for military modernization and transformation.

Close to 750 attended the conference, which was designed to help Air Force, DoD teammates and industry counterparts communicate about changes critical to the defense of the nation. @

Net Index

Due to the number of submissions we receive, some sections of *news@afrl* are available exclusively on-line. The on-line version of the newsletter allows users to view the AFRL corporate calendar, news releases generated by AFRL headquarters, operating instructions, L@b L@urels and Roundups sections.

The L@b L@urels section of the electronic newsletter is dedicated to members of Air Force Research Laboratory who receive awards and honors. The Roundups section of the electronic newsletter keeps Air Force Research laboratory employees informed about contracts AFRL has awarded. Below is an index of articles one can find in each of these on-line sections.

L@b L@urels

Roundups

To view the full text of these and other articles visit the *news@afrl* page on the Internet at http://extra.afrl.af.mil/news/index.htm.
To submit L@b L@urels or Roundups from your directorate, send a query to AFRL Public Affairs at:

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- **DE scientist selected as member of National Academy of Engineering**
- **Presidential Rank Awards presented to two AFRL directors**
- **Rome officer selected for quarterly honor**
- **Cooperative Research and Development agreement signed**
- **Rome awards contract for computer-based training**
- **AFRL Rome awards two-year contract to GrammaTech**

For more on these stories see news@afrl http://extra.afrl.af.mil/news/index.htm

ML, Wilberforce join educational partnership

WRIGHT-PATTERSON AIR FORCE BASE, Ohio — Wilberforce student Reuben Dlamini (left) helps Air Force Research Laboratory Materials and Manufacturing Directorate's Maj. Stanley Rogers, and Edward Asikele of Wilberforce load a Unix work station into a van. Members of the directorate transferred the work station to Wilberforce University as part of an educational partnership agreement. The agreement sets a number of cooperative measures into motion, including a special provision that enables the directorate to loan or transfer surplus research equipment to the school. (Air Force photo)